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HAYES, SOLOWAY P.C. 130 W. CUSHING STREET TUCSON, AZ 85701			LI, SHI K	
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			2633	

DATE MAILED: 02/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No. **09/909,265**Applicant(s) **SMITH ET AL.**Examiner **Shi K. Li**Art Unit **2633**

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 September 2004.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-37 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-9, 11, 16, 17, 19, 20 and 26-37 is/are rejected.
7) ☒ Claim(s) 10, 12-15, 18 and 21-25 is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

2. Claims 1, 3-4, 16 and 36 are rejected under 35 U.S.C. 102(a) as being anticipated by Kim et al. (S. Kim et al, "Regenerator Placement Algorithms for Connection Establishment in All-Optical Networks", IEE Proc-Commun., Vol. 148, No. 1, February 2001).

Kim et al. teaches a method for establishing a connection in a WDM network. Kim et al. teaches connection request in p. 26, right col., first paragraph. Kim et al. then teaches to use dynamic programming to compute cost of each viable regenerator path. Finally, Kim et al. teaches to choose the path with minimal cost for the connection (see p. 27, Section 2.1, *Problem Formulation Using Dynamic Programming*).

Regarding claims 3-4, Kim et al. teaches to select path based on occupation cost.

Regarding claim 16, Kim et al. teaches in Table 3 to order the viable regenerator paths in a matrix according to the number of regenerators (K regenerators are used in stage K).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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4. Claims 2, 5-9, 11, 19-20, 26-28, 30 and 34-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. (S. Kim et al, "Regenerator Placement Algorithms for Connection Establishment in All-Optical Networks", IEE Proc-Commun., Vol. 148, No. 1, February 2001) in view of Banerjee et al. (D. Banerjee et al., "A Practical Approach for Routing and Wavelength Assignment in Large Wavelength-Routed Optical Networks", IEEE Journal of Selected Areas in Communications, Vol. 14, No. 5, June 1996).

Kim et al. has been discussed above in regard to claims 1, 3-4, 16 and 36. Regarding claims 2 and 19-20, the difference between Kim et al. and the claimed invention is that Kim et al. does not teach constructing N valid link paths. Kim et al. focuses on regenerator placement given a route from a source to a destination. Banerjee et al. teaches to find a route given a source and a destination. Banerjee et al. teaches to use extended breadth-first search which terminates after it has found a desired number of alternate paths (see p. 904 right col., first paragraph). One of ordinary skill in the art would have been motivated to combine the teaching of Banerjee et al. with the regenerator placement method of Kim et al. because given a source and destination a route must be chosen first in order to apply the method of Kim et al. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply extended breadth-first search to find a route between a source and a destination, as taught by Banerjee et al., and then apply the regenerator placement method of Kim et al. to the chosen path.

Regarding claim 5, breadth-first search uses a path search tree.

Regarding claim 6, extended breadth-first search terminates after it has found a desired number of alternate paths.

Regarding claim 7, it is well known in search tree method to abandon branches that are unlikely to give satisfactory result.

Regarding claim 8, Banerjee et al. teaches in p.904, left col., last paragraph to reduce the number of variables by eliminating links that are not pass through. It is obvious to also eliminating nodes that are not pass through and include link and node that must pass through to further reduce the number of variables.

Regarding claim 9, Banerjee et al. minimizes the hops (cost) of the path.

Regarding claim 11, it is obvious that if a breadth-first search reaches all its leaves, the algorithm terminates.

Regarding claims 26-28 and 30, it is obvious to include routing module, regenerator placement module, wavelength assignment module and control unit for implementing the modified regenerator placement method of Kim et al. and Banerjee et al.

Regarding claims 34-35, Kim teaches in Eq. (1) to evaluate BER for regenerator paths and engineer regenerator paths such that they all meet BER requirements.

5. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. (S. Kim et al, "Regenerator Placement Algorithms for Connection Establishment in All-Optical Networks", IEE Proc-Commun., Vol. 148, No. 1, February 2001).

Kim et al. has been discussed above in regard to claims 1, 3-4, 16 and 36. The difference between Kim et al. and the claimed invention is that Kim et al. does not teach to declare a best path when an aggregate occupation cost above a threshold. However, it is obvious that at each stage, the smallest number in the row can be considered as a threshold. If an aggregate occupation cost at the destination node of an earlier stage is less than the threshold, the

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corresponding path is the best. For example, in Table 3, since the aggregate occupation cost at node 10 of stage 5 is 1.588 and is less than any number in row of stage 6, the corresponding path is the best. One of ordinary skill in the art would have been motivated to declare a viable regenerator path as best without completing the whole calculation in the method of Kim et al. because such approach shortens the calculation time and establishes connection quickly. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to declare a best path without completing the calculation cost for all possible paths in the method of Kim et al. because such approach shortens the calculation time and establishes connection quickly.

6. Claims 29, 31-33 rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. and Banerjee et al. as applied to claims 2, 5-9, 11, 19-20, 26-28, 30 and 34 above, and further in view of Jukan et al. (A. Jukan et al., "Service-Specific Resource Allocation in WDM Networks with Quality Constraints", IEEE Journal on Selected Areas in Communications, Vol. 18, No. 10, October 2000).

Kim et al. and Banerjee et al. have been discussed above in regard to claims 2, 5-9, 11, 19-20, 26-28, 30 and 34. The difference between Kim et al. and Banerjee et al. and the claimed invention is that Kim et al. and Banerjee et al. do not teach user defined performance constraints. Jukan et al. teaches that service-specific connection requests has become increasingly important and in setting up lightpath connections, quality-of-service (QoS) must be taken into consideration (see p.2051, left col., first paragraph. Jukan et al. presents in FIG. 1 a generic approach and in Section III algorithms for wavelength routing and resource allocation. One of ordinary skill in the art would have been motivated to combine the teaching of Jukan et al. with

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the modified method of Kim et al. and Banerjee et al. and include user defined performance constraints in selecting paths because lightpath for difference services requires different QoS and if the QoS of a path does not meet the user requirement it cannot be accepted for providing service. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to include user defined performance constraints in addition to cost, as taught by Jukan et al., in selecting path in the modified method of Kim et al. and Banerjee et al. because lightpath for difference services requires different QoS and if the QoS of a path does not meet the user requirement it cannot be accepted for providing service.

Regarding claims 31 and 33, Jukan teaches to take into consideration QoS (user defined performance and cost constraints) in setting up lightpaths.

Regarding claim 32, Kim teaches in Eq. (1) to use BER for evaluate regenerator paths. BER is an indication of signal quality.

7. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. (S. Kim et al, "Regenerator Placement Algorithms for Connection Establishment in All-Optical Networks", IEE Proc-Commun., Vol. 148, No. 1, February 2001) in view of Levandovsky et al. (U.S. Patent Application Pub. 2002/0063915 A1).

Kim et al. has been discussed above in regard to claims 1, 3-4, 16 and 36. The difference between Kim et al. and the claimed invention is that Kim et al. does not teach to evaluate paths based on an end-to-end performance parameter. Levandovsky et al. teaches in FIG. 3 to evaluate path based on its BER. One of ordinary skill in the art would have been motivated to combine the teaching of Levandovsky et al. with the method of Kim et al. because a path cannot be used to provide service unless its BER is within an acceptable range. Thus it would have been

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obvious to one of ordinary skill in the art at the time the invention was made to evaluate paths based on its BER to select a best path, as taught by Levandovsky et al., in the method of Kim et al. because a path cannot be used to provide service unless its BER is within an acceptable range.

Allowable Subject Matter

8. Claims 10, 12-15, 18 and 21-25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

9. Applicant's arguments filed 3 September 2004 have been fully considered but they are not persuasive.

The Applicant argues that Kim does not disclose or suggest the engineering of "a plurality of viable regenerator paths" as recited in claim 1. The Examiner disagrees. Kim teaches in FIG. 1 four (4) regenerator lightpaths between source node $a=0$ and destination node $b=10$. The four regenerator lightpaths are $B_{0,2}$, $B_{2,4}$, $B_{4,7}$ and $B_{7,10}$ according to the notation of Eq. (1) and Eq. (2) of Kim. Therefore, Kim teaches all the limitations of claim 1, 3-4, 16 and 36, and these claims are unpatentable under 35 U.S.C. 102(a).

The Applicant argues that Kim nor Banerjee, taken separately or in combination, neither suggest the construction of 'n' valid link paths connecting a source node and destination node nor the configuring of 'm' groups of viable regenerator paths corresponding to a respective associated link path, as recited in claim 2. The Applicant then argues that there is no suggestion or motivation in Kim or Banerjee to combine one with the other. The Examiner disagrees. To appreciate the teaching of Kim and Banerjee, some background knowledge is helpful. Kim and

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Banerjee address the problem of wavelength routing in mesh WDM network. Kim clearly indicates that the regenerator placement algorithms are built on top of wavelength routing and cites in the introduction section references [1-3], i.e., Ramaswami et al., Zhang et al. and Mokhtar et al., which are included in PTO-892 of instant Office Action as prior art references. Banerjee also teaches improvement on wavelength routing and cites, for example, Zhang et al. In summary, the teachings of Kim and Banerjee are as follows. Given a WDM mesh network, we want to setup lightpaths between source-destination pairs. There may exist a plurality of lightpaths between a given source-destination pair. Banerjee teaches to find an optimal lightpath that meets certain criteria. Once an optimal lightpath is found or selected, Kim teaches to divide the lightpaths into a plurality of regenerator paths such that the cost is minimized. This reads on claim 2 and claims 19-20.

Regarding claim 34, Kim teaches in Eq. (1) to evaluate BER for regenerator paths and engineer regenerator paths such that they all meet BER requirements. This reads on claim 34.

Regarding claims 31 and 33, Jukan teaches to take into consideration QoS (user defined performance and cost constraints) in setting up lightpaths.

Regarding claim 32, Kim teaches in Eq. (1) to use BER for evaluate regenerator paths. BER is an indication of signal quality.

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO**

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MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shi K. Li whose telephone number is 571 272-3031. The examiner can normally be reached on Monday-Friday (8:30 a.m. - 5:00 p.m.).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on 571 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

skl
27 January 2005


M. R. SEDIGHIAN
PRIMARY EXAMINER